the case of the unit force pattern of unit **4**, generated force is fixed and the rotation torque of the knob **10** has a fixed weight.

[**0057**] The above unit force patterns are stored in the first memory **12***a* of the control unit **12**. The line-ups of the unit force patterns are stored in the second memory **12***b*. Nine line-up patterns are shown in **FIGS. 5A** to **5**F.

[**0058**] When the number of composite force patterns is large, the total of the memory capacity for storing unit force patterns (**FIG. 4A** to **FIG. 4D**) and the memory capacity for storing the line-up patterns of the unit force patterns (**FIG. 5A** to **FIG. 5F**) is much smaller than the total of the memory capacities for storing respective composite force patterns (**FIG. 3A** to **FIG. 3F**).

[**0059**] To form the composite force pattern shown in **FIG. 3A** from unit force patterns, unit **1**, unit **2** and units **4** are used such that one unit **1** and one unit **2** are arranged and then five units **4** are arranged after the unit **1** and the unit **2** as shown in **FIG. 5A**.

[**0060**] To form the composite force pattern shown in **FIG. 3B** from unit force patterns, units **4** are used as the unit force patterns such that nine units **4** are arranged as shown in **FIG. 5B**.

[**0061**] To form the composite force pattern shown in **FIG. 3C** from unit force patterns, units **1** are used as the unit force patterns such that three units **1** are arranged as shown in **FIG. 5C**.

[**0062**] To form the composite force pattern shown in **Fig. 3D** from unit force patterns, units **2** are used as the unit force patterns such that nine units **2** are arranged as shown in **FIG. 5D**.

[**0063**] To form the composite force pattern shown in **FIG. 3E** from unit force patterns, units **3** are used as the unit force patterns such that nine units **3** are arranged as shown in **FIG. 5E**.

[**0064**] To form the composite force pattern shown in **FIG. 3F** from unit force patterns, units **2** and units **3** are used as the unit force patterns such that four pairs of a unit **2** and a unit **3** are arranged one after another and then one unit **2** is placed after these.

[**0065**] In the diagrams of the composite force patterns shown in **FIGS. 3A** to **3**F, the rotation angle of 0° may be the current position of the knob **10** or a predetermined rotation position.

[**0066**] Thus, the composite force patterns are formed from the unit force patterns.

[**0067**] In the above embodiment, the one-dimensional rotation angle is used as an amount to be detected by the position sensor. The present invention is not limited to this and the position sensor may detect the amount of movement of the operation unit.

[**0068**] The composite force patterns of the above embodiment are not limited to combinations of the unit force patterns of the above embodiment and may be various combinations.

[**0069**] Mountain-like unit force patterns have been described as the unit force patterns for obtaining a click feel sensation in the above embodiment. The present invention is not limited to these and valley-like unit force patterns may be used to obtain a click feel sensation.

[**0070**] In the above embodiment, the actuator **3** has been described as an electromagnetic coil. The present invention is not limited to this and a DC motor may be used as the actuator **3**. In this case, the DC motor is attached to the operation shaft **8** of the knob **10** directly or indirectly through a gear to give torque (generated force) in the same rotation direction as the rotation direction of the knob **10** or in the opposite direction to the rotation direction of the knob **10**.

[**0071**] As described above, the force feedback device of the present invention includes an operation unit, an actuator for providing a feel sensation to the operation unit, and a control unit for controlling this actuator, wherein the control unit stores a plurality of different unit force patterns, forms composite force patterns by combining the unit force patterns and controls the actuator based on the composite force patterns to provide feel sensations to the operation unit.

[**0072**] Since the unit force patterns are combined by the above constitution, only a memory for storing a small number of unit force patterns and a memory for storing the line-ups of combinations of the unit force patterns are required, thereby reducing the required total memory capacity (ROM capacity) even when the number of different force patterns increases.

What is claimed is:

1. A force feedback device comprising an operation unit, an actuator for providing a feel sensation to the operation unit and a control unit for controlling the actuator, wherein the control unit stores a plurality of different unit force patterns, forms composite force patterns by combining the unit force patterns and controls the actuator based on the composite force patterns to provide feel sensations to the operation unit.

2. The force feedback device according to claim 1, wherein one of the plurality of unit force patterns is a mountain-like one of which force increases from a predetermined value and then decreases or a valley-like one of which force decreases from a predetermined value and then increases to provide a click feel sensation.

3. The force feedback device according to claim 1, wherein one of the plurality of unit force patterns has an ascent in which force increases from a predetermined value to provide a deceleration feel sensation.

4. The force feedback device according to claim 1, wherein one of the plurality of unit force patterns has a descent in which force decreases from a predetermined value to provide an acceleration feel sensation.

5. The force feedback device according to claim 1, wherein one of the plurality of unit force patterns is like a horizontal straight line that force does not change from a predetermined value to provide a fixed force feel sensation.

6. The force feedback device according to claim 2, wherein one of the plurality of unit force patterns has an ascent in which force increases from a predetermined value to provide a deceleration feel sensation.

7. The force feedback device according to claim 2, wherein one of the plurality of unit force patterns has a descent in which force decreases from a predetermined value to provide an acceleration feel sensation.